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ORIGINAL ARTICLES.

NEW RESEARCHES UPON PLEURO-PNEUMONIA AND ITS PREVENTIVE INOCULATION.

BY DR. WILLEMS.

SECOND PART.

After giving the concise history of the progress of inoculation * in the different countries of the globe ; after having explored the extensive domain of positive and convincing facts in favor of that practice, facts observed and collected under most variable circumstances, by savants and agriculturists, placed in the most opposite conditions, and even sometimes adverse to that practice ; after having given a short aperçu of the deductions reached by the most authorized observers, I continue this study on exudative pleuro-pneumonia by proposing some scientific and practical considerations, which I submit with confidence to the high appreciation of the Academy.

* This forms the first part of the paper, and consist in a review of the results obtained from the operation in different parts of the world.

This is the object of the second part of this paper. I hope to prove to you, gentlemen, that my experiments and doctrines of thirty years ago, relating to bovine pleuro-pneumonia and to the inoculation of that disease, after having been criticised, far from being mythical or utopian, as considered by some, offer to-day as then, and more than at that time, characters of an incontestable exactitude. They are based upon positive facts, and a rigorous observation of the phenomena which take place in the order of nature.

The principles I expressed on this subject, in my first publications, have become more evident as time and experience have progressed. I resume them in the following fundamental propositions. I will explain some extensively, placing at the disposition of the Academy the demonstration of the others, if it is its desire to open a discussion upon the important question of the preventive inoculation of bovine pleuro-pneumonia:

I. Exudative pleuro-pneumonia is a general and specific disease (*totis substantiæ*).

II. It is contagious, inoculable by miasma or volatil, and by fixed virus. It never originates spontaneously.

III. Inoculation produces a general disease, similar in the whole to that which is known as exudative pleuro-pneumonia.

IV. Exudative pleuro-pneumonia attacks, with rare exceptions, the same animal but once.

V. Properly inoculated, the animal is protected from pleuro-pneumonia; he resists the contagion.

VI. Inoculation produces no effect upon an animal cured of pleuro-pneumonia, nor upon one inoculated successfully the first time.

VII. Pleuro-pneumonia is an affection proper and exclusive to bovines; it is not transmissible to any other animal, nor to man, either by contagion or direct inoculation.

VIII. The pathological product of inoculation is as a whole, similar to the exudated matter in the lungs, or other organs of the sick animal.

IX. The inoculated disease transmits exudative pleuro-pneumonia only by re-inoculation.

X. The fresh liquid product of the exudation of the lungs of a sick animal, in the first or second degree, is the best to inoculate with.

XI. The tail of the animal is the best part to implant the virus.

XII. Inoculation produces effects more violent upon the subject, or in the herds exposed to epizootic than upon others not contaminated.

XIII. Inoculation does not act as derivatives do, such as seton, trochiscus, &c.; it is not either, a septic inoculation.

XIV. The virus of pleuro-pneumonia possesses the properties of virus in general, that is, those of contagion, incubation and regeneration.

XV. In the exudate of the lungs, in the collections of the pleura, and again in other parts of the diseased animal, as also in the products of the inoculation are found germs corpuscles—microbes which are the agent of the transmission of pleuro-pneumonia.

XVI. Exudative pleuro-pneumonia, better known to-day, must not any longer be classified in the class of virulent, but in that of parasitic diseases.

I.

CONTAGION AND SPONTANEITY.

At the time of my first researches upon exudative pleuro-pneumonia, in 1849 and 1850, those, who until then, had studied this disease, were far from agreeing as to its nature and its contagious character. Some considered it as a purely inflammatory disease of the pulmonary tissues, brought on by external causes, such as cold, giving rise to a pneumonia *a frigore*, such as a too alibile, exciting food, &c. Others, more perspicacious, saw in it a general disease,—an affection of a specific and contagious nature, and this opinion prevailed principally in Germany. These two opinions upon the nature and character of exudative pneumonia, gave rise to two parties of observers, the contagionists and the spontaneists.

To-day, opinions have changed, and almost all those who have studied this serious problem admit the contagion; only a few, and

that is the smallest number, while they admit it, believe that this affection may, in peculiar cases, originate in the concurrence of external circumstances and without the contact of a sick animal carrying the germ of the disease.

At the time of the publication of my first paper on pleuro-pneumonia, Huzard, Delafond, and many others, had denied the contagion; Verheyen and Fallot doubted and did not admit the existence of a virus. Fallot, however, one of the most elevated and enlightened minds of this learned body, said in a report made in 1852 upon a paper that I had sent to the Academy at that time:

"All the theoretical views followed by Mr. Willems in his treatise are dominated by a question of fact, in which the commission has not to inquire. In it, all is subordinated to the existence in exudative pleuro-pneumonia, of a virus transmissible and apt to communicate a disease similar to that of which it is the product, and, to admit such a virus, it would be at least necessary to have the proof that the transmission has taken place; as long as we have not, the existence of the virus remains doubtful, and all the consequences deduced from it, all hypotheses, ingenious or not, conceived to explain now the efficacy of inoculation, and again, the reverses which followed it, fall from lack of support."

Since that time, the solution of the question has made immense progress, and in the actual condition of disease who would dare to deny the contagion?

All those who have seriously studied that question admit it as certain, such as Chabert, Henry Bouley, Saint-Cyr, Mathien, Sanson, Chenier, Reignault, Tabourin, Chauveau, Bollinger, Ulrich, Gerlach, Hering, Zundel, Wellenbergh, Jennes, Simonds, Gamgee, Bruce, Cox, (of Dublin) Fleming, &c., the veterinary school of Lyons, those of Germany and Netherlands, all the official commissions, Belgian, French, German, Italian, Netherlands, &c.

Here is, amongst those, the opinion of the French scientific commission, of which M. Magendie was president and M. Henry Bouley, reporter:

"Epizootic peripneumonia of horned cattle is capable of transmitting itself by cohabitation from diseased to healthy animals of the same species."

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But, in admitting that pleuro-pneumonia is contagious, could it not originate spontaneously from internal causes, or has it always necessarily as an originating cause the impregnation of the organism by a virus from the outside?

This last opinion is the most accredited and the best founded.

"Can contagious peripneumonia," said M. Henry Bouley, "originate spontaneously?"

"No," says he, "for it is *contagious*,"—M. Tabourin answers us. "As long as the question of its contagiousity remained doubtful, its spontaneous developement might be admitted as probable; but since the researches of Dr Willems upon the contagion and the virulency of this species of peripneumonia, M. Tabourin cannot comprehend that its spontaneity could still count partisans. Starting from the absolute principle that contagion is identical with generation, he is necessarily brought to deny the possibility of the spontaneous development of a disease whose contagious properties are known. This manner of conclusion is consequent with the doctrine, but is it concordant with facts?"

In 1874, Mr. Bouley seemed to be still in doubt, but I believe that at present his conviction is in favor of the solution of that question.

My personal experience, after a close observation during long years, of the march of pleuro-pneumonia, has convinced me that this affection is exclusively contagious, transmissible from sick to healthy animals by inoculation and by infection, that is to say artificially by fixed and naturally by volatile virus. It never originated spontaneously.

Mr. Pasteur does not admit the spontaneity for transmissible diseases, and certainly he is right for what concerns the etiology of several contagious diseases, whose parasitic nature is already known. This principle is also applicable to peripneumonia, whose special factor is a parasite, a living being.

Gentlemen, I will try to demonstrate to you that facts based, I repeat, upon rigorous observation and experimentation, justify this opinion. The solution of the question of the spontaneity of pleuro-pneumonia is, nevertheless, of great importance in practice, as upon it depends the adminis-

trative measures, sanitary and prophylactic, to be taken for the protection of cattle and consequently for the good alimentation of human species.

By insisting at length upon the question of spontaneity and of contagion of exudative peripneumonia, I have for my object to demonstrate that the facts of practice agree with the doctrine upon the nature and pathogeny of this affection, which, for me, proceeds from a parasite, and consequently never arises spontaneously, the spontaneous generation of this parasite being impossible, according to the recent researches of Mr. Pasteur, Tyndall and others.

A. In the town of Hasselt, and in all the province of Limbourg, I have never seen and never heard that pleuro-pneumonia had originated spontaneously. On the contrary, everybody knows the exact date of its first invasion and it has been easy to follow its march through the province, from one point to another. The first diseased animal was introduced in 1836, from Flanders, in the town of Hasselt, where never before that time, any case of pleuro-pneumonia had been seen; and from that time it spread with frightful rapidity in the city and surroundings. Since, it has not disappeared from the stables of distilleries; it has been kept up by contagion, following the introduction of contaminated animals, coming from foreign markets, especially those of Holland and Germany, because the distillers of the town of Hasselt receive a great number of horned cattle often renewed.

The disease having once taking lodging in a stable, it is only extirpated with difficulty; notwithstanding the use of the most powerful disinfectants, contagion exists; it attaches itself to the ground, the beams, straw, walls, &c., and a long time after the stable has been emptied and white-washed, even for years, the miasma dried and preserved, reproduces itself by the introduction of fresh animals, under the influence of the warm and damp air, becomes loose and falls upon them to infect them. Here is an example, taken amongst many others of my acquaintance.

In the village of Curange, near Hasselt, there is a farm where, about three years ago, four cattle were affected with pleuro-pneumonia and were killed. The barn remained empty from 1877

till 1880. A new farmer came and placed in that barn four cows; coming from a farm where they were raised, and where there never was a case of pleuro-pneumonia. These animals had not been in contact with any other diseased beast and nevertheless two amongst them became pneumonic. Is this a case of spontaneous pleuro-pneumonia! No, it is more than probable that the miasma of the disease was preserved in that barn since the existence of the epizootic which prevailed there. What we observe, concerning the long duration of the conservation of the miasma of pleuro-pneumonia, was observed also for several contagious diseases of man.

Mr. Hairion, the learned Professor of the University of Louvain, our honorable colleague, cites analogous cases relating to granular palpebral ophthalmia, an affection which he has perfectly studied and upon which he has thrown so much light. He relates in his *Memoir* upon that disease in the army, published in 1848, facts observed in the barracks of the Dames-Blanches at Louvain, and in the young ladies' school at Thildonck, where the contagious principle was propagated by the medium of contaminated objects and was preserved in the said barracks of the Dames-Blanches for a long time, when, under the influence of favorable circumstances, it returned in the air, thus forming new centers of infection, susceptible of reproducing the disease amongst those living in it.

Mr. Hairion reports that soldiers arriving perfectly healthy in the barracks, and being carefully examined, contracted palpebral ophthalmia in the undisinfected and empty rooms, where in one case eighteen months, and in another three years before, diseased men had lodged.

And again, the experiments made by Mr. Pasteur, relating to the theory of spontaneous generation, have proved that all over in the air are suspended the germs of lower organisms and more particularly in hospitals, rooms with large gatherings of people, stables, &c., &c.

In 1861 Dr. Eisel, of Prague, placed between two beds, in a ward occupied by thirty-three children affected with purulent ophthalmia, an instrument analogous to the areoscope of Pouchet;

amongst the corpuscles of the air gathered against the plate of glass, moist with glycerine, were found globules of pus perfectly evident.

To this fact is added that of Mr. Nepveu, chief of the laboratory of the Pitié, recently presented to the Society of Biology :

A square meter of the wall of a surgical ward, which had not been washed for two years, was cleaned, and the liquid squeezed out of the sponge used for that purpose, examined immediately afterwards. It was blackish in its whole mass, and contained micrococci in large quantity, some microbacteria, and besides epithelial cells in small number, some globules of pus, red globules, and finally irregular blackish masses and ovoid bodies of unknown nature. The experiment was carried with all precaution to avoid causes of error ; the sponge used was new, and thoroughly washed in recently distilled water.

In the stables infected by exudative pleuro-pneumonia, the air condensed upon a vase containing cold water, and collected on a clean plate, has given me the proof that this liquid contains the peculiar corpuscles that one finds in the lungs of animals affected with pleuro-pneumonia.

A plate of glass moist with glycerine, hung during several hours in a stable containing diseased animals, and examined with the microscope reveals also the presence of the peculiar corpuscles, which I will describe further on.

That which, experimentally, made me believe also that the expired air of the lungs of a sick animal, as well as the saliva, contains the germ of the disease, is the fact that diseased animals to be given up for consumption, starting from Hasselt, before the establishment of railways, followed especially three roads—one towards the abattoir of Liege, one towards those of Brussels and Anvers, the third towards Beverloo.

And, after some time, all the inns on the road where those animals had stopped, and even the farms situated on those roads became infected.

Here amongst others is a fact corroborating the preceding ones :

A small herd, composed of four or five diseased animals, was slowly going towards Beverloo by an out-of-the-way road, when

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towards evening those animals, worn out by fatigue, were clandestinely introduced in a field situated near the farm of Terlamen, where they passed the entire night, and soiled the grass with their infected saliva. The next day the herd of the farmer was placed in the same pasture, and shortly after, almost all the animals of the farmer were affected with the epizooty.

I have said that the diseased animals which often pass the road to the camps are to serve as food for our soldiers, who ordinarily eat poor meat, and that because the war administration tries, before all, to buy meat at low rates. It costs from seventy to eighty centimes a kilo. This meat of diseased beasts is neither succulent nor very pleasant to eat, but, I must declare, is not injurious to public health. Pleuro-pneumonia not being contagious to man, there is no danger in consuming the meat of diseased animals, so long as the alteration caused by the disease has not arrived at its last period; and you all, gentlemen, especially those who live in large cities, have eaten more than once the meat of pneumonic animals.

At the time of my first experiment upon pleuro-pneumonia, when that disease existed with such intensity that a large number of animals were destroyed and consumed in the city; when the knacker himself, by an unaccountable toleration, sold ostensibly and at low price the meat of animals often pneumonic in the third degree, I have collected the statistics of the mortality of the population of Hasselt during five years (1850-1855), and I have found that during those years, where a great portion of the population were eating meat from diseased animals, well-to-do families especially, there were comparatively less deaths than during previous years. I explain this difference in the mortality by the reason that meat is necessary to keep up the health of man, and that it is better to eat meat of pneumonic animals than not at all.

Mr. Loiset, veterinary surgeon at Lille, is of the same opinion. He has shown that during a period of nineteen years, 10,000 peripneumonic cows have been consumed, without having observed a single accident, without the slightest disturbance in the sanitary condition of the people.

(To be continued.)

EXPERIMENTAL ANALYSIS
OF THE MALIGNANT PUSTULE AND CARBUNCU-
LOUS ŒDEMA; DETERMINATION OF THEIR
VARIOUS FORMS AND OF THEIR
DEGREES OF VIRULENCY.*

By M. COLIN, of Alfort.

Continued from page 264.

II.

I arrive at the second point of my communication, the most interesting. It covers several questions, first, the following:

1st. Is the carbunculous pustule of the dog or that of other animals which have died from it, virulent?

2d. If it is, is it so at all its periods or at some determined time?

3d. If it is, how does its virulency stop spontaneously, without giving rise to the general accidents which kill man and herbivorous animals?

Let us answer these questions:

In the first place, one might believe, *a priori*, that the carbunculous pustule, by the fact that it does not bring on general accidents on carnivora, is an incomplete pustule; pathologically considered a sterile and non-virulent pustule? It is not so, however. It is complete; it is as fertile as in the species where it has fatal terminations.

But, to insure its virulency, one must proceed with method, not attack it too early and avoid to take up that which has been inserted in the puncture by the lancet or the needle. The liquid introduced in it preserving its properties for a certain time, would induce a belief in an artificial virulency. In 1873 I demonstrated that the septicemic virus, without action upon horse or donkey, is found intact after several days in the small puncture

* From Archives Veterinaires.

where it has been deposited, so much so, that carried upon a rabbit, it kills him with its ordinary rapidity. After twenty-four hours, when the carbunculous pustule is well defined, the serous liquid which escapes spontaneously from the puncture, or which is squeezed by pressure, is apt to give anthrax to the rabbit, guinea pig, and to all the animals liable to contract it. That which is obtained the second, third or fourth day, still possesses its activity. Here are the proofs.

The serosity of a carbunculous œdema of the dog in the twentieth hour killed a rabbit in four days.

That of a malignant pustule in an animal of the same species proved virulent at the twenty-fourth hour. That of the œdema of another, virulent at the forty-eighth hour.

That of a carbunculous tumor was virulent at the forty-eighth hour and killed at the seventieth.

That of a malignant pustule of forty-eight hours killed a rat.

The serosity of a tumor of seventy-two hours has also proved virulent.

That taken from the interior of a malignant pustule, which had proved fatal after six days, had yet a weak virulency.

On the contrary, that property was often absent in the same liquids, though they contained bacterides, even at an epoch very near the first moments of the evolution of the tumors, pustules or œdema.

For instance, the serosity of the œdema of a cat became sterile at the forty-second hour.

That of a pustule of fifty hours produced no effect.

The bloody serosity obtained on the dog by scarifications on a tumor of one hundred and twenty hours, produced no accident.

The serosity oozing from a malignant pustule of a dog at the seventy-third hour, was sterile.

The serosity of the phlyctenæ of the same pustule at the seventy-fourth hour, sterile. In those three liquids there were some bacterides and many shying granules, having the character of the corpuscle germs of bacterides.

Finally, the serosity of a carbunculous œdema of the horse, and the reddish liquid of a carbunculous tumor of the same

animal, both at the eighth day, have shown no virulent property.

Outside the opening, on a radius of one, two and three centimetres, the serous liquids, the blood of the tumor obtained by small scarifications equally possessed virulent properties during several days, and, remarkable fact, the virulency extends around the opening as it diminishes in its interior, either by diffusion of the virulent elements, or by their progressive neutralization in the plastic or purulent products as in the parts of tissue that gangrene invades. The virulency which has spread from the centre to the circumference of the tumor dies out in the same order; it may disappear completely in the centre, when at the periphery it retains all its activity.

However, at a given time all the liquids of the tumor or of the carbunculous pustule are not equally virulent. Two amongst them, the serosity of the phlyctence and the pus from the cavity of the opening or of the viritiated cellular tissue, are seldom such and never strongly so. The 'cloudy serosity, somewhat loaded with leucocytes, ordinarily is; very clear pus is only in half of the cases; but thick pus, that which loosens the eschar or carries off gangrenous parts, has already lost this property.

Beyond a certain period, whether there is or not suppuration, whether the opening of the pustule is closed or enlarged by the work of gangrene, or of ulceration, whether there remains or not marks of irritation, all virulency disappears and the inoculation of the serosity, of the blood, of the solid particles sloughed off from the pustule, all remain entirely sterile.

There are, then, in the carbunculous tumor or in the pustule which gets well of itself, as in that which kills, virulent elements, associated in variable proportion to the serosity, to the blood, to the lymph, to the tissues, even to the pus in way of formation; but these elements are there only temporarily, they change places before disappearing, rarify in certain parts, condense together in others, whither they are to die in situ or spread in the whole of the organism.

These peculiarities which I observe upon animals, especially upon the dog, explain very well the opposite results given by inoculation of the products of the malignant pustule of man. The facts mentioned by Mr. Raimbert, prove indeed that the insertion

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of the serosity of the vesicles, round the eschar, is almost always sterile, while that of the tissues of the pustule give often, but not always, anthrax. One must not hope for concordant results in operating upon liquids whose properties are not uniform in all the points of the tumor, and vary according to the periods of the diseased process.

Now that the virulency of the carbunculous pustule is well established, it remains for us to inquire why upon certain animals, this virulency dies out spontaneously, and why, in others, it gives rise to fatal general accidents.

Let us take two dogs with carbunculous pustules, developed at the same time, in the same place, for instance the axilla or the mammæ, and let us follow them comparatively: the first, second, third day, the tumors in both animals may resemble each other exactly; they will give clear serosity, virulent, more or less loaded with bacteridies; there will be little fever and anorexia, but no digestive troubles, no prostration. From the end of the third, fourth, or the fifth day on one of the patients, the tumor may lose its red color, sink down, ulcerate on its summit, or will suppurate and then the fever will abate, the appetite return, and the animal recover without treatment. But on the other, on the contrary, the tumor, instead of passing towards resolution, remains, becomes marbled, purplish, the fever continues, the weakness increases, the pulse weakens, and finally coldness and death, as in the case of generalized carbunculous affection.

These differences in progress of the pustule do not seem to be deduced from the aspect or size of the tumor, nor from the violence of the local irritation, nor the intensity of the fever. One must look for the reason of it in the concealed characters of the morbid process.

Let us then take two other dogs in the same condition, and after watching them, let us kill them the fourth, fifth or sixth day. Here is what we will find:

Upon the one whose tumor is in way of resolution, the liquid of the puncture has disappeared; if a small quantity remains, it contains only leucocytes, fine granules, no bacteridies; the blood vessels are free, there is but little extravasation of blood, almost

no œdema; the ganglions nearest to the tumor are scarcely tumefied, without change of color. Their pulpe inoculated to the rabbit does not produce anthrax, the spleen is not hypertrophied, the heart has no ecchymosis, the intestinal mucous membrane is not at all congested. Upon that animal, anthrax has remained a simple local accident; the virulency has died in its start, the bacteridie has disappeared from the cavity where it was introduced, from the œdema where it has spread and from all parts where it has died, without leaving marks of its presence.

Upon our second dog, it will not be the same if the pustule has been followed by general accidents. The tumor has preserved its size, the skin is of a dark color, perhaps cyanotic; its blood vessels are gorged with viscous blood, all its tissues are infiltrated with bloody liquid; there is œdema spreading round. Every thing is virulent in the tumor; the bacteridie is in good abundance; here long and flexuous, there in short separated segments, some transparent, others with shying points on their tract or at their extremities. Besides, anthrax has spread beyond the limits of its starting point; not only the prepubic, mammary and inguinal ganglions are tumefied, blackish, often reduced to pulp; but the pelvic, the sub-lumbar and all those which are on the way of the virulent elements, present similar alterations; their pulp is full of bacteridies longer than those of the blood. If the disease is at its end, the spleen is hypertrophied, loaded with bacteridies like the lymphatic glands; the small intestines begin to be congested, ecchymoses are found in the left cavities of the heart, &c., &c.

(*To be continued.*)

INOCULATION FOR THE LUNG PLAGUE OF CATTLE.—ITS DRAWBACKS.*

In our former article on this subject attention was drawn to the fact that inoculation leads only to a mitigation of the losses in this disease, but that in no country has it succeeded in annihilat-

* From the *National Live Stock Journal*.

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ing the contagion. In the one city (Edinburgh) in which the result of annihilating the disease has been claimed, it was shown that there existed special conditions, which eminently adapted the city to benefit by this measure without danger of spreading the disease, and that, without at all detracting from the value of inoculation in that particular instance, it was only just to note that it was there supplemented by the slaughter of the sick and disinfection of the premises, which, in the absence of inoculation, had virtually stamped out the disease from New York City in an equally short period of time. In the present paper will be set forth some of the dangers that would attend a general resort to inoculation over a whole country.

The same contagious material is propagated in the inoculated disease as in the disease contracted in the natural manner.—To read the writings of most advocates of inoculation, one might be led to suppose that they were operating with a poison entirely different from that of the lung plague. A well-known author says:

“An objection to inoculate which weighs in the case of human and ovine small pox, as well as rinderpest, is, that the inoculated disease is contagious; that the cohabitation of healthy with inoculated animals may lead to extensions of the infection, and that the foci whence the disease spreads are always on the increase. Such objections cannot weigh against the inoculation for the lung plague, as the inoculated malady is not communicated, except by re-inoculation. My observations on this point are very numerous, and I do not know of a single instance recorded in which contagion from inoculated animals has been witnessed.”

Such confident assertions would cast grave doubts on the value of the operation as a preservative from the plague. The liquids inoculated are the virulent products of the diseased lung; and as these do not produce disease of the lungs of the inoculated animal, but only of the tissues where they have been inserted, it cannot be supposed that they exert any influence on the economy through any direct action on the lungs. If protective at all, it must be by reason of the propagation and increase of the disease germs of the lung plague in the blood, or in the seat of inoculation. If in the blood, there must be danger of their being given

off by the various free surfaces of the body, and, above all, by the lungs. If in the seat of inoculation only (the tail), they would still escape from the raw surface, as the infection is spread from the pustules of small-pox, with the scurfy products of the skin in scarlet fever, or with the liquid products of the open sores in farcy. It is true that the amount of the virus scattered from the tail of the inoculated animal is incomparably less than that exhaled with every breath by an animal which has contracted the disease in the lungs; and this difference has led to the fallacy that contagion cannot be spread from the inoculated. Yet it must be plain to all that the inoculators are here placed on the horns of a dilemma—either the diseased germs inoculated in the tail do not reproduce themselves there, and cannot, therefore, protect the subject against the disease, or they do grow and increase in the seat of inoculation, protect the system of the inoculated animal against the assaults of the disease, and expose all inoculated and susceptible animals in the vicinity to contract the disease in its fatal form in the lungs, by reason of the virulent matter given off by the surface of the inoculation sore.

But we are not left to mere inference in deciding this most important question. Even the strong advocates of inoculation now testify to the occasional communication of the disease by the inoculated animal. In the quotation above made, it is admitted that the disease can be conveyed from the inoculation sore by reinoculation on a sound animal. But as the virus can be carried in the air, as evinced by its conveyance from the lungs of one animal to those of another, in the ordinary mode of infection, the same must be accepted as true of the same virus when developed in the tail; and the writer, who denies contagion from the inoculated wound, and yet claims that successful inoculation can be made from it, condemns himself, and is put hopelessly out of court.

Much more consistent are the statements of Mr. Watson, and they should carry the greater force in that he had a more extensive experience with inoculation in Australia and New Zealand, having had, in the latter colony, the superintendence of a station with 10,000 head of cattle:

"Inoculated cattle convey the contagion to those which are not

inoculated among coming from the of cattle among from p Further inoculation of death excessively every contagion ease."

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inoculated.—This has been proved by the disease breaking out among cattle where it had not previously shown itself, after their coming in contact with some inoculated animals which were free from the disease when inoculated. Cases of this sort, and even of cattle being inoculated before the disease had broken out among them, are so few that decisive evidence in this way is far from plentiful, but it is sufficient to establish the general fact. Further, it has frequently been the case, where all the others were inoculated, that a few head have been missed, and the percentage of deaths among those which were not operated on was always excessive; thereby showing that the inoculation of the disease on every side of them not only rendered their escape from the contagion impossible, but seemed to increase the virulency of the disease."

The writer can fully endorse this statement from his experience in New York. In certain stables it was the practice to inoculate every animal as soon as received. In some such stables no disease of the lungs would appear so long as the system was fully carried out; but sometimes a bull or a calf would be left without inoculation, and such almost invariably fell a victim to the malady.

In New Jersey, prior to the enforcement of the State measures for the suppression of the disease, inoculation was loudly praised, and was frequently adopted even in herds that had shown no disease. The State veterinary inspectors reported various cases in which, after the inoculation of a healthy herd, the disease of the lungs had appeared in the herd in question.

Reynal (a strong advocate of inoculation), in his "Police sanitaire des Animaux domestiques," p. 458, says, *apropos* of the question of the specific, virulent character of the inflammation in the inoculation wound:

"A fact which we have ourselves observed removes all doubts in this respect. A Brittany heifer, inoculated by us, communicated the peripneumonia to two others that were placed at her sides in one of the stables in the school at Alfort. The lesions characteristic of the malady were clearly shown at the autopsy in the lungs of these two heifers."

Reason and experience agree in showing that the virus of lung plague may be communicated from inoculated to uninoculated cattle, and may be laid up and preserved in the stables where inoculation has been practiced, to infect uninoculated cattle that may be brought into such stables at a later date.

Can the stables infected by the inoculation of all the cattle of a State be perfectly disinfected?—Knowing what we do of the city cow stables and country barns that would be infected by a general adoption of inoculation, he would be a bold man who would assert that it would be possible to thoroughly disinfect all of those. The removal and disinfection of hay, straw and other fodder, the destruction of all rotten wood, the removal of wooden floors, and of the saturated earth beneath them, the re-inoculation of all subjects that fail to *take* at the first attempt, the rigid quarantine of all herds until the effects of the inoculation have passed off, the inoculation of all calves or other fresh cattle introduced into such herds, the maintenance of sick animals and infected places for the obtaining of fresh virus for constant use,—would render the measure far more expensive, unwieldy, and uncertain than at first sight appears. In the method of extinguishing the disease by the sacrifice of the sick, disinfection is demanded in such places only as the sick have occupied, or where their products have been carried. Even in such circumstances, and with a very limited number of infected places, disinfection is often found to prove a difficult problem. But with a general inoculation, every bovine animal becomes an infected animal, and every building or place where such an animal is kept, becomes an infected place. To take but a single city, like that of New York, with its thousands of herds, kept in all sorts of out-of-the-way places, many of them unknown and unregistered by the city authorities, with many of the owners unfavorable to the practice, and inclined to throw obstacles in the way, it would be an exceedingly difficult process; but when extended to country districts, where cattle are often turned out in woods and swamps, where it is exceedingly difficult to find them, it is inevitable that numbers would be overlooked and missed, to be infected later by the inoculated cattle in the same or adjoining enclosures, and to keep up the poison for the new comers in the shape of calves and fresh purchases.

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As an illustration of how inoculation works, even with those who adopt it by choice, and are anxiously desirous to have it succeed, a case now transpiring at East Williston, Queens Co., N. Y., may be here quoted. In May last, after the reprehensible action of the New York Legislature had compelled the suspension of all effective sanitary work, and invited a renewed spread of the plague over districts that had been cleared, a cow was taken from the west end of Long Island into the herd of Mr. Richard H. Robbins, East Williston. She sickened, and was killed September 9th. Seven or eight other cows having suffered, inoculation was resorted to; but the inoculated cattle were kept in a field, separated by a fence only from several other herds, the property of neighboring farmers. Time will tell what the results will be. Those who have had anything to do with the quarantining of cattle on the *parole* of their owner, know how often slips are made and contact is allowed between the stock that are nominally secluded and those of others. The danger thus arising in a limited number of cases, under the process of stamping out by the sacrifice of the sick, would be increased a hundred fold by inoculation, though this were confined to infected localities only.

But the increase of such risks implies a corresponding increase of infected places and of the demand for disinfection; and as a certain number of outbreaks are always secreted, it would be practically impossible to carry the disinfectants along every channel of the stream of contagion.

Inoculation for Lung Plague not the Counterpart of Vaccination for Small-Pox.—When people are informed that a mild and non-fatal disease can be produced by inoculation for lung plague, they naturally conclude that they have here the exact counterpart of the vaccination practiced on man, and they give a favorable verdict without further consideration. But this is altogether fallacious. In vaccination the virus used and reproduced on the human skin is not that of small-pox, but of the mild and harmless cow-pox; and no matter how many non-vaccinated persons may come in contact with the subject of the operation, none can be thereby exposed to contract small-pox. *Cow-pox* may be contracted in this way, but *small-pox*, never.

A close parallel to the inoculation of the virus of lung-plague is, however, to be found in the inoculation with small-pox matter, which was practiced before the discovery of the protective action of vaccination, or cow-pox inoculation, as also in the inoculation with the matter of sheep-pox, still practiced as a protective measure on the continent of Europe. Inoculation with small-pox matter produces the genuine small-pox, and inoculation with sheep-pox virus produces the sheep-pox unchanged. The disease in each case is milder, if judiciously managed, than the affection caught in the usual way, and the losses are reduced to a minimum; but unprotected men and sheep coming in contact respectively with the inoculated men or sheep, or with their dwellings or products, contract the genuine small-pox or sheep-pox, as the case may be, and too often with all its native severity. So with inoculation of the lung-plague virus, the disease is determined in an unimportant organ—the tail—and is rarely fatal to the animal; but the disease germ is not altered, and if taken in by a susceptible animal through the air, will determine the fatal affection of the lungs. Inoculation with small-pox matter has been long discarded; inoculation with sheep-pox matter is attended with the greatest danger, and was most profitably substituted by the sacrifice of the sick, and by disinfection, in the more recent outbreaks in England; and so ought inoculation for lung plague be prohibited, except in certain safely secluded situations, in all countries where it is possible to eradicate the plague by other and more certain means.

Comparative Expense of the Mitigation of Lung Plague by Inoculation, and of its Extinction by the Sacrifice of the Sick and Infected.—This has been already hinted at in these articles, but deserves to be yet more particularly noticed. Mr. Watson says that with proper appliances five or six men can inoculate 500 to 600 cattle per day. He quotes the pay of one operator at \$50 per day; but not to be extravagant, we will suppose that this should remunerate the five or six men requisite. This would make the operation cost 10 cents per head, which cannot be considered excessive. This, for the 30,000,000 head of cattle in the United States, would cost \$3,000,000. But this does not provide

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for the sacrifice of sick cattle to furnish the virus to be inoculated, for the disinfection of buildings, etc., where the inoculated cattle have been kept, for the re-inoculation of those that fail to take, for the inoculation of new-born calves, for the erection of pens in which to inoculate large and wild herds, and for numerous other attendant expenses. These cannot be set down at less than \$3,000, 000 more. But Mr. Watson's estimate is made for large herds of 1,000 to 10,000, and must be greatly increased for our small herds of 5 to 50 in the Eastern States. \$6,000,000 would therefore be far under the mark for a single general inoculation of our American cattle. But as we have already seen, no past experience with inoculation in any part of the world holds out the hope that this would rid the country of the contagion. The practice would therefore have to be kept up with each succeeding generation of cattle if they were to be rendered proof against the contagion, and thus a permanent tax of a grievous and altogether unnecessary kind would be imposed on the country.

This will be met by the statement that it will not be necessary to inoculate *all* the stock of the country, and that if we restrict our estimate to the cattle of the infected districts it will not be so excessive. This is conceded; but it must be conceded also by the party on the opposite side, that with the maintenance of the practice of inoculation there would be a permanent preservation of the contagion, that at the margins of the inoculated districts there would be the ever-present opportunity for a wider extension of the disease, and that under this method, as at present, there would be the constant danger of a sudden conveyance of the disease to the great West in the body of an infected animal, and of the pollution of the source of the cattle traffic, so that we must never forget the probability that we may soon have to adopt just such a general inoculation, not to stamp out the contagion, but merely to lessen the losses from its ravages.

In addition to all this, there is the undeniable fact that the existence of the disease on our soil persistently imposes a most oppressive tax on our exports to England, as is clearly shown in another article in the current number of the *Journal*, where this aspect of the question is fully presented.

Now there can hardly be a doubt that in the present status of the lung plague in America it can be definitely and permanently eradicated from the continent at a cost of \$2,000,000, judiciously applied. The question then, as regards inoculation and all other means of temporizing with this disease, is just this: Shall we preserve this plague at a yearly cost of from \$2,000,000 to \$5,000,000, or shall we once for all spend \$2,000,000 on its extermination, and free the country forever from the scourge?

EXTRACTS FROM FOREIGN JOURNALS.

INTRA ABDOMINAL HEMATOMA INTERMITTENT COLICS—DEATH.

BY M. PIOT.

A small percheron mare, 7 years old, is taken sick the day after she is bought. She has some slight colic and soon is in great pain. The coat is staring, the head hangs down, eyes partly closed. Pulse, 72, soft, mucous membranes subicteric; respiration short, trembling and accelerated, 38 per minute; temperature, 40°4. Heart and lungs show no signs of disease. Anorexia complete, great thirst. The abdominal cavity, whose walls are somewhat retracted, show nothing particular. The uterus is empty, the ovaries and kidneys have their normal size. Nothing is discovered by rectal examination. Slight diarrhœa. Urine healthy.

A diagnosis of acute enteritis is made and the animal is placed under treatment accordingly. No great change or amelioration is observed, and the animal dies in great emaciation after about two weeks of treatment.

At the autopsy an enormous tumor, quite spherical, entirely surrounded by the mesentery, and measuring from 20 to 25 centimeters in diameter, is found adherent in front, to the right lobe of the liver near its superior border and its posterior face; the posterior vena cava runs alongside of it in a kind of groove situa-

ted towards the superior face of the tumor. At its inferior face and a little to the left it is intimately adherent to the small colon, and by its superior part it adheres also to the duodenum. Forward and to the right it is partly covered by the pancreas; behind it is attached to the right kidney and partly surrounds the great mesenteric artery. It weighs 7 kilog, 650 gr., (over 15 pounds) and is constituted by clots of blood in different degrees of organization.—*Archives Veterinaires*.

DOUBLE PARTURITION IN A MARE—BIRTH OF A COLT AND A DONKEY.

BY M. BLANCHARD.

A mare 10 years old, after a rather difficult labor, gave birth to a horse colt. Some time afterwards she was observed having labor pains again, with violent efforts of expulsion, and the front legs of another foetus were soon protruding through the vulva. She was delivered then by her owner of a second subject, which proved to be a little donkey, which died shortly afterwards.

The explanation of this singular fact is given as follows: In that part of the country it is generally believed that two services by the males are most efficacious to have the mare in foal. As it is not always easy to have a stallion to do this service, a jackass is often used for the second covering, and this is just what took place in this instance, the mare having thus been fecundated by those two animals of different species.—*Journal de Zootechnie*.

FEMALE STRONGYLUS-GIGAS FOUND IN A MAMMARY TUMOR, NEAR THE UMBILICUS IN A BITCH.

BY M. MEGNIN.

This bitch had a litter of pups, and, though her milk was abundant, she soon refused to let them suck. Having much milk, the man who had charge of her was obliged to milk her.

Following this condition a lump had shown itself under one of the mammæ near the umbilicus, of the size of a goose egg, interfering with the motions of the dog, especially when hunting.

The skin being cut through, the tumor was exposed, divided by an incision with a razor and the worm made its exit. The skin being sewed up, the animal recovered.

Mr. Megnin says that this is the first time where this worm has been found in the sub-cutaneous abdominal tumors. The strongylus gigas has been found in man, though in very few instances; it is found, rare also, in some domestic animals, the horse, the ox, and especially the dog; it has also been met, perhaps oftener, amongst wild carnivora, the wolf and the bison.

The kidneys, the bladder, the urethra and the surroundings of these organs are the tissues where it is most generally seen.—*Gazette Medicale.*

EXPERIMENTAL STUDY

OF THE ACTIONS PRODUCED UPON INFECTION AGENT BY THE ORGANISM OF SHEEP MORE OR LESS REFRACTORY TO ANTHRAX; WHAT BECOMES OF THE SPECIFIC MICROBES, DIRECTLY INTRODUCED INTO THE CIRCULATION BY LARGE TRANSFUSIONS OF CARBUNCULOUS BLOOD.

BY A. CHAUVEAU.

To resume, says the author, this is what happens to the carbuncular bacteridies, introduced by transfusion of the blood in the organism of subjects refractory to anthrax, when the resistance of this organism is great and strengthened again by good preventive inoculations:

1st. Bacteridies introduced in the circulatory apparatus soon disappear; a few hours after the transfusions none can be found. After death they are also missing. Yet, in some cases of rapid death, the clots of the heart may contain a few capable of infectious activity.

2d. If bacteridies disappear from the blood, it is not because they are destroyed; they are first stopped in the capillary network of the lungs, then in that of some other parenchymatous or-

gans, where they are carried by the circulation. They are very easily found in the lungs and spleen, when death follows rapidly in transfusions of carbunculous blood; like those of the clots of the heart, they yet possess their vitality and may be inoculated with success.

3d. When the animal survives more than three days after the transfusion, bacteridies disappear from the lungs and spleen, as they have from the blood, and the subject recovers.

4th. Then, not only there is no proliferation of bacteridies in those parts of election, splenic, pulp and blood, but the bacteridies introduced by the thousand millions in those are soon destroyed after passing probably through a series of periods of infectious activity, gradually decreasing.

5th. The inaptitude of the organism to the continuation of life of bacteridies, is not however complete: one region at least makes exception, this is the surface of the encephalon. Bacteridies carried and gathered in the meshes of the pia-mater may survive there and grow and produce a mortal inflammation. But the growth takes place with peculiar characters; elongations and inflexions of the clusters, apparition of spores; characters which look somewhat like the proliferations of bacteridies in artificial cultures or *after death*, under certain conditions of heat and of medium, in the organs and the blood of subjects which succumb to the true *sang de rate*. Those characters are never seen *during life* on those last animals; the multiplication takes place by scission in short clusters.

6th. The infectious activity of these bacteridies of the pia-mater is very great and contrasts with the sterility of the blood of the other parts of the body. Nevertheless, from what has been said previously, one cannot consider as absolutely perfect, this peculiar local activity preserved in an organism enjoying a general immunity.

A CASE OF THE LONGEST INCUBATION OF HYDROPHOBIA IN MAN.

MR. LEON COLIN reported to the Academie de Medicine, of Paris, a case of human hydrophobia with an unusually long incu-

bative stage. It was that of a soldier who had been bitten in Algeria, the 2d of November, 1874, and died four and a half years afterwards. From a minute inquiry Mr. Colin arrived at the following conclusions: 1st. It was certainly a mad dog which had bitten that soldier in Algeria, as the individual he tried to assist had died of hydrophobia forty days after. 2d. Since that inoculation in November, 1874, he had felt no effect from it, and had not been exposed to any other accident. 3d. The previous history of the patient, the symptoms observed, the lesions found, exclude all presumption of alcoholism.—*Gazette Medicale*.

BORIC ACID IN GREASE.

An ointment of boric acid, prepared according to the prescription of Neumann, is said to be most beneficial in that disease of the lower parts of the extremities. These are washed off with tepid water, or better, with a weak solution of the acid, and then the ointment laid over the diseased parts.—*Report fur Thierheilkunde*.

PREVENTIVE INOCULATION OF PLEURO-PNEUMONIA.

In the excellent chronicle of the *Recueil de Medecine Veterinaire* of last month, Mr. H. Bouley says: "Notwithstanding the numerous facts collected from all parts of the world, which speak in favor of the practice of preventive inoculation of pleuro-pneumonia, doubts remain yet in some minds regarding its efficacy, because it is sometimes unsuccessful. There is also another reason. It is that the inoculation is not accompanied with pulmonary manifestations—viz.: that it does not repeat in its form and its seat, the disease from which the inoculated virus proceeds, as it generally happens for other virulent diseases. To remove those doubts and judge definitely, the question of knowing if the pneumonic inoculation truly infects the whole organism, one might

have recourse, it seems to us, to certain experiments, similar to those which are now used for animals which are submitted to the preventive inoculation of anthrax, to find out if they have counteracted immunity from that disease. It is known that this quality once obtained, the inoculation of carbunculous virus, known as very strong, gives rise only to slight phenomena, and even after two or three inoculations the organism becomes perfectly indifferent to the insertion of new quantities of virus, even in large doses. Here is a way to follow to have the effects of pneumonic inoculation: Once done at the tail, the only region where it can be performed with impunity, on account of the intensity of the local phenomena following the insertion of the virus in parts where the connective tissue is loose and ready for rapid infiltration, another inoculation might be made, not at the tail, but upon another of these parts rich in cellular tissue, and allow to appreciate if the caudal inoculation has really been successful in the sense of general infection. In fact, if it has had for result to protect the organism against the pleuro-pneumonic virus, as the preventive inoculation for anthrax, the insertion of that virus, no matter in what region, ought to be as harmless as that of carbunculous virus is, when immunity exists. If, on the contrary, this insertion gives rise on the cow inoculated at the tail, to phenomena as serious as those found in animals entirely virgin of all inoculation, proof will be evident that the virus inserted at the tail has been without general effect. This would be a criterion of a great certainty, which, in the case of positive solution, would allow no doubts upon the preventive effect of the caudal inoculation. I will add that once this question settled, it would become possible to take advantage of the obtained immunity by a first caudal inoculation in strengthening it by a second in another region; the organism being sufficiently protected by the first, the other would be performed without danger in any region of the body.—*Recueil de Medecine Veterinaire.*

HUMAN AND ANIMAL VARIOLÆ: A STUDY IN COMPARATIVE PATHOLOGY.

BY GEORGE FLEMING, F.R.C.V.S., ARMY VETERINARY INSPECTOR.

(From the *Veterinary Journal*, London, England.)

(Continued from p. 329).

HORSE-POX.

I have casually and repeatedly alluded to horse-pox, and it is necessary to again refer to it; as, if what transpired at the Vaccination Conference is to be taken as evidence of our state of knowledge with regard to this kind of variola, we would deserve to be accused of unpardonable ignorance. If for no other object also than to rescue the reputation of Jenner from the charge of error preferred against him in this matter, it would be more than worthy of our attention. It is well known that Jenner expressed himself as of opinion that cow-pox was derived from horses affected with what was then, and is even now, properly termed "grease." But for very many years, and also at the recent conference, it has been denied that there was any relationship between the disease of the horse and cow-pox; and on the latter occasion it is reported that one of the speakers in remarking that "all who were acquainted with the subject were well aware that there were some erroneous views originally held by Jenner with respect to the conveyance of that particular disease (cow-pox) from one animal to another—from the horse to the cow, and that it was in consequence of that conveyance that the cow became affected with a disease that he called cow-pox," added: "In the present day, perhaps, it was unnecessary for him to say that among veterinary surgeons who were acquainted with the lower animals, that opinion had always been negatived. He was of opinion that Jenner saw the disease of the animal, and that it was of a repetitive nature, which by his own observations he was well aware did not possess any particular quality." It is scarcely necessary to remark that intelligent students of veterinary medicine do not negative Jenner's

opinion, but know for a well-established fact that he was justified in that opinion; inasmuch as horses suffer from a malady closely resembling the so-called "grease" (which is simply a kind of catarrhal inflammation of the sebaceous follicles of the skin at the lower part of the limbs), and that this malady is transmissible to the cow and to mankind, producing a train of symptoms so exactly like vaccinia that no material difference can be discerned between the two maladies.

Jenner was too serious a philosopher and exact an observer to make light assertions or superficial examinations, and he only erred when he stated that the one source of cow-pox, and even of small-pox, was to be found in the horse. He was absolutely correct as to a particular cutaneous disease of the horses' limbs being transferred, by means of human hands, to the cow's udder, and there producing cow-pox, which again could be communicated to people and protect them from small-pox. The facts, accidental and experimental, upon which he based his assertion, are unmistakable and indisputable, and the "sore heels" or "grease" he describes as affecting horses and infecting the farriers who shod, or the grooms who attended to them, was nothing more or less than "equine variola" or "horse-pox," a disease which appears to have been far more frequent then than now, probably owing to the insanitary condition in which horses were kept in those days. Reference to his work* will show that Jenner knew more of the variolous diseases of animals than many more recent authorities, and that this "sore heel" disorder, or "grease," was eruptive in character, and could produce cow-pox. Jenner's discovery—for discovery this really was—was confirmed by Dr. Loy, of Pickering, who, in a little pamphlet which appears to be now quite unknown,† is even much more explicit than Jenner with regard to the nature of this inoculable "grease," and he resorted to direct experimentation to prove the relations between it and cow-pox. His earlier experiments failed, in consequence of his not being able to dis-

* "An Inquiry into the Causes and Effects of the Variolæ Vaccina, a disease discovered in some of the Western Counties of England, particularly Gloucestershire, and known by the name of cow-pox." London, 1798.

† Account of some Experiments on the Origin of the Cow-pox. 1802.

tinguish between the ordinary and the specific malady. At last, he states, he had the good fortune to find a horse on whose heels the matter was much more limpid than in all the preceding ones—on the fourteenth day of the disease, the seventh of the discharge from the heels. Four cows inoculated with this matter showed the usual symptoms of cow-pox, and a child also inoculated with it on the arm on the third day had a papule surrounded by slight inflammation; on the fourth day the papule was very elevated, and on the fifth day there was a purple-tinted vesicle; on the sixth and seventh days the vesicle had increased and was darker. At the same time there was a fever, headache, quickened respiration, frequent pulse, white tongue, etc., which symptoms declined towards the ninth day. On the sixteenth day after inoculation from the horse, the child was inoculated with small-pox matter without result. Loy alludes also to a farrier and a butcher of Pickering, who, in applying dressings to the heels of a horse affected with "grease" became inoculated. Desirous of ascertaining whether the pustules which were on the hands and forehead of the butcher could communicate the disease by inoculation, he inserted some of the matter from one of them into the arm of his brother, who had never had small-pox. The result was exactly the same as inoculating with cow-pox virus. Loy recognized two kinds of "grease"—one merely local and non-infective, the other local and constitutional (eruptive), which gives the disease to those who groom or handle the affected horses. With the first kind there was no general disturbance, but with the second at the commencement the horses exhibited symptoms of fever "from which they were relieved as soon as the disease appeared at the heels, and there was an eruption of the skin. The horse, the matter from which communicated the disease by inoculation, was very unwell until the appearance of sore heels, which was, in all the other cases, accompanied by an eruption over the greater part of the body." The fact that inoculation from the "constitutional grease" was a protection from small-pox, and that the rather severe effects of direct transmission from the horse to the human species were modified by passing the virus through the cow, or through mankind, was fully recognized by this enlightened

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observer; as well as the other important fact, that the matter was only certainly effective when perfectly limpid, which was in an early stage of the disease. Loy likewise remarked that neither the original nor the communicated disease was infectious through the medium of the atmosphere.

The observations of this contemporary of the illustrious Jenner are extremely interesting, while they are decisive as to the intimate relationship existing between horse-pox and cow-pox. Though his pamphlet consists of only a few pages, it contains facts of great moment with regard to our subject, and there is perhaps nothing more astonishing in the whole range of medical literature, and especially that of vaccination, than the oblivion into which the record of his observations immediately fell. The opinion so strongly expressed by Jenner, based as it was on well-observed facts, and the convincing demonstrations (clinical and experimental) of Dr. Loy, do not appear to have availed much in establishing the existence of such a malady as horse-pox. Very long ago a few experimenters, medical and veterinary (among the latter of whom was Coleman)—in order, I suppose, to test the correctness of Jenner's view—attempted to transmit the "sore heels" or "grease" to horses and cattle, but failed, as Woodville and Simmons (mentioned by Loy) had previously done, and for the same reason—they inoculated from the local non-constitutional malady, overlooking the distinction which had been so well drawn by the Pickering physician with regard to the simple cutaneous disorder and the specific eruptive one. Consequently, Jenner was set down as having made a mistake; the existence of horse-pox was denied, and even at the recent Vaccination Conference the same speaker who asserted that veterinary surgeons had always negatived Jenner's opinion, said that Jenner saw the disease of the animal ("grease"), "and that it was of a repetitive nature [*sic*], which by his own observations, he was well aware, did not possess any particular quality. * * With the exception of the sheep, he knew of no other animal that was affected with variola. There was an equine variola which was produced from the cow (?) but he had never seen variola from the horse. He knew it had been stated of late that cases of that disease had occurred in France,

but all he said was that our observations had been extensive and minute, and they had seen nothing approaching to it in a horse or dog, or any other animal except the sheep." Five years before these words were spoken, the horse-pox had been carefully described in English veterinary literature, and the malady had not only been observed on the Continent, but in England and America, and its existence proved over and over again beyond a doubt.

Dr. Loy's pamphlet was translated into French by Dr. Carro, soon after its appearance in England, and published in the "Bibliothèque Britannique" in the year X (vol. xxi.). Carro was a great admirer of Jenner, and he dwelt with much force on the clearness and precision of Loy's experiments, as furnishing indubitable proof of the justness of the opinion of the introducer of vaccination. But Carro, in his eulogistic comments on Loy's work, remarks that the French vaccinators had experienced great difficulty in understanding what the English term "grease" really meant, some thinking it was *javart* (fistula of the foot from injury), or *eaux aux jambes* (simple inflammation of the sebaceous follicles—*vulgo*, common "grease")—"an uncertainty," adds Carro, "which shows what little care the English have observed in describing the *grease*, and is probably the cause of the small progress this interesting portion of the veterinary art has made among them." The French veterinarians and medical men who tried Loy's experiments had no better success than those in England who did not have recourse to the eruptive disease for inoculating material; consequently, in France, also, Jenner and Loy were believed to be in error, and nothing more was thought of horse-pox or "constitutional grease."

But it is curious, in the midst of this incredulity, to find Carro himself adducing most valuable confirmatory proof of the correctness of Jenner and Loy's statements, in a letter addressed to Professor Pictet, of Geneva, in 1803, and published also in the "Bibliothèque Britannique." In this letter Carro writes: "Les maréchaux-ferrants de Salonique distinguent trois sortes de javart: l'érouelleux, le phlegmoneux, le variolique. Ce dernier paraît être le même que le *grease* constitutionnel du docteur Loy, car il est accompagné d'une éruption semblable à la petite vérole. Aussi,

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d'après le rapport des bergers Albansais, les vaches sont elles sujettes dans ce pays à une maladie qui paraît avoir une grande ressemblance avec le cow-pox des Anglais ; et ce que décide la question, c'est que le docteur Lafont, établi depuis longtemps à Salonique, en Macédoine, a réuissi à produire la véritable vaccine sur deux enfants inoculés avec le virus pris sur les jambes d'un cheval atteint de cette troisième espèce de javart, quoiqu'il ne produisit aucun effet sur une vache soumise aussi à cette inoculation ; et cette vaccine s'est propagée de ces enfants à d'autres par l'inoculation, avec ses caractères et sa bénignité ordinaires."

And evidence proving the existence of horse-pox was cropping up now and again, though it was not readily accessible to the medical world of those days. For instance, in the spring of 1805, Viborg, professor at the Copenhagen Veterinary School, inoculated a cow with matter obtained from the heel of a horse affected with the specific form of so-called "grease." On the fifth or sixth day on the udder and teats were bright transparent vesicles, with the characteristic areola and umbilicus of cow-pock ; and the cow exhibited a high degree of fever, while the secretion of milk was nearly suspended.* Sacco made similar experiments, and these and his observations are as valuable as Loy's, confirmatory as they were, of the existence of horse-pox, and its ready transmissibility to men and cows, producing an exanthem which could not be distinguished from cow-pock.† In 1830, Professor Hertwig and eleven students of the Berlin Veterinary School, became inoculated through handling horses affected with the disease in the limbs, more particularly. This form of grease—in reality horse-pox—was then prevailing as an epizooty in North Germany.‡ In the same year Professor Ritter, of Kiel, found a man who had been accidentally inoculated in the hand with matter from horses' heels. The vesicle or pustule exactly resembled that of a cow-pox, and from it he inoculated two children ; the result was undoubted vaccine vesicles.§ In this year, also, Dr. Rosendahl,

* "Vet. Selsk. Skifter," vol. ii, p. 137.

† Trattato di Vaccinazione, con osservazioni sul giavardo et Vajuolo pecorini," 1839.

‡ "Med. Zeitung von dem Verein in Preussen," 1834.

§ Pfaff's "Mittheilungen aus dem Gebiet der Medicin." Jahrgang ii. Kiel, 1833.

of Nostorf, had the opportunity of observing the transmission of horse-pox to several men; there was accompanying fever, and in some cases delirium.* Berndt alludes to an instance in which a boy was infected from a horse suffering from the so-called "epizootic grease," (*épizootischer mauke*), and from the eruption on him people were inoculated most successfully, fine cow-pocks being developed.† And so on with other instances.

But in every country to which Jenner's views had penetrated, much uncertainty prevailed with regard to the nature of the disease termed "grease" or "sore heels;" and therefore disappointment only too often followed attempts to transmit it to the cow, and so to produce cow-pox.‡ In Italy, for instance, the term was translated into *giardone*, pedal fistula; and the possibility of producing such a disease as cow-pox from this condition placed the reputation of Jenner very much at the mercy of captious critics.

In 1840, Dard saw the disease among horses in France, and called it *Rhinite pemphigoides*; in 1843 it was again observed in that country by Bouley, now director of the French Veterinary Schools, who designated it *Herpes phylotenoide*, to distinguish it from glanders and farcy, which it somewhat resembles. But it was not until 1860 that the discovery of Jenner and the researches of Loy received further confirmation, and scientific attention was seriously directed to it. In the spring of that year the horses in the commune of Rieumes, not far from Toulouse, were attacked with a disease which assumed an epizootic form, and in less than three weeks more than a hundred were affected. M. Sarrans, the district veterinary surgeon, reported the disease as commencing with slight fever, soon followed by local symptoms, the chief of which was hot and painful swelling of the limbs, with an eruption of small pustules on the surface of the tumefied parts. In three to

* *Ibidem*. Altona, 1835.

† Rust's "Kritischer Repertorium," band xxi.

‡ In the nomenclature of disease drawn up by a joint committee of the Royal College of Physicians, and published in 1869, I find "grease" named *Equinia mitis*, and defined as "a pustular eruption produced by the contagion of matter from a horse affected with the grease."

five days a purulent kind of discharge took place in the pastern, which continued for eight to ten days, during which the inflammatory phenomena gradually subsided; then the pustules desiccated, and towards the fifteenth day the crusts began to fall off, carrying the tufts of hair with them, and leaving more or less perceptible cicatrices. The eruption appeared not only on the limbs, but on other parts of the body, particularly on the nostrils, lips, flanks and vulva. There was no cow-pox present in the locality, and the extension of the disease seemed to be due entirely to contagion. No fewer than eighty mares were infected from being sent to the government stallions at Rieumes, the ropes with which their hind limbs were secured (passing round the pastern) being impregnated with the discharge from the heels of some diseased mare. Only three mares and two stallions escaped attack. One of the animals exposed to infection chanced to be sent to Toulouse, and not appearing so well as usual, it was left at the government veterinary school. It was not until it had been there for eight days that Professor Lafosse observed the mare to be dull, suffering from inappetence; and lameness in both hind limbs, with difficulty in flexing the fetlocks, and a hot, painful swelling, confined to the left fetlock, extending higher on the right leg. On these swollen parts small tufts of hair were erect here and there, and at those places there were what appeared to be pustules, from which exuded a fluid matter possessed of ammoniacal odor, but less fetid than that of steorrhœa ("grease"). Lafosse thought at first that it was only the latter disease in an acute form; and he was happily inspired to inoculate a cow, in order, once more, to submit the Jennerian doctrine to an experimental test. The experiment was made eight days after the manifestation of the eruption on the mare, and was perfectly successful. Papules, then pustules, formed on the cow wherever the matter obtained from the mare had been inserted with the lancet—large, flat, firm and round pustules, with a central umbilicus, which caused the borders to appear raised—they were the vaccine vesicles, in fact. Another cow was inoculated from this one, and had a very fine cow-pox, from which a child and a horse were vaccinated, and these had a magnificent vaccinal eruption. A second child, inoculated with

the matter from this horse, had, in its turn, a well-developed pock. Comparative inoculations were then made on children and horses with the equine virus and the ordinary humanized vaccine, and it was found that the former produced larger and finer pustules than the latter, though their evolution was slower. Lafosse designated the disease the *maladie pustuluse vaccino-gene* of the horse.

Bouley, then professor of clinics at the Alfort veterinary school, not quite satisfied with what had been done in this direction by Lafosse and others, resolved to inoculate cows with all the eruptive maladies of the horse, which his daily routine of professional duty brought before him; and, singular to relate, the very first case (in 1863), was a successful one, and produced a beautiful cow-pox. The horse presented the following symptoms: On the inner surface of the lips, on the inferior aspect and free portion of the tongue, on the buccal and gingival membrane and on the floor of the mouth—particularly along the Whartonian ducts—were infinite multitudes of small vesicles, about the size of a pea, some circular, others elongated, and whose opaline tint was in marked contrast to the bright-red mucous membrane on which they were seated. These pearl-tinted vesicles were smooth on their surface, had no depression, and felt rather tense; pain was evinced when they were pressed upon. In some places they were confluent, in others discrete. When they had been ruptured, there were small, lenticular, very red sores, with sharply defined borders. A very abundant saliva, rendered frothy by the incessant movement of the tongue, filled the mouth, and escaped in long masses from its commissures. With the exception of not eating so well as usual, the horse appeared in good health. The symptoms were so different from those described by Loy and Lafosse, that Bouley thought it was an aphthous stomatitis, and that therefore, like the foot-and-mouth disease of bovines, it must be contagious. True to his resolve, he inoculated a cow to see what the result would be, and produced veritable cow-pox, from which children were most successfully vaccinated. For some months other horses were admitted to the clinic of the school, suffering from the same disease, which varied in its symptoms only with regard to the seat of eruption, which was in some instances as in the first case, and in

others as in Jenner's, Loy's and Lafosse's cases. From these multiplied observations and experiments, most carefully watched, and discussed by the most eminent medical and veterinary authorities in Paris, there could no longer exist the shadow of a doubt as to the nature of the disease, which was accordingly designated "equine variola" by Depaul, and "horse-pox" by Bouley himself. Bouley confesses that for years he had met with the disease among horses from time to time, but until Lafosse's experiments at Toulouse he had not suspected its variolous nature.

From time to time outbreaks of the disease have been recorded in France, where it appears to be most prevalent in Paris and in its neighborhood.

So long ago as 1853, I witnessed, in Manchester, a case of inoculation of a farrier who had shod a horse affected with "grease." The vesicle was situated on the chin, and there was great constitutional disturbance.

In "Veterinary Sanitary Science and Police," I have devoted a chapter to it, and in the periodical edited by me, the *Veterinary Journal*, I have alluded to it frequently (particularly in vol. v., p. 81; vol. vii., p. 371; vol. ix., p. 204). A translation is also given of an interesting report by Prof. Ellenberger, of the Berlin veterinary school, of an outbreak of what he describes as "stomatitis pustulosa contagiosa," but which was really horse-pox. In this respect the ready communicability of the disease and its vaccino-genous character is well shown. In a recent number of the *Deutsche Zeitschrift für Thiermedizin*, Prof. Friedberger, of the Munich veterinary school, furnishes an excellent account of an outbreak in that city, and a record of successful experiments. A translation of this paper appears in the *Veterinary Journal* for September, 1880. In German and Italian veterinary literature similar outbreaks are described. For the past two or three years there has prevailed widely among horses in England, Ireland and Scotland a pustular exanthem, very contagious in its character, and known among grooms and others as the "boil disease," the "American boil disorder," etc., which, in some of its features, if not in all, somewhat resembles horse-pox. The eruption in the majority of cases is mainly confined to the trunk. From England

it has been carried to Belgium, where it has attacked a large number of horses. Horse-pox has also prevailed as an epizooty for two years, and is now prevalent at Montreal. Many persons have been accidentally inoculated, and the vacciniferous character of the disorder has been established by medical and veterinary authorities. The outbreak is described in the *Veterinary Journal* for August, 1877. Last October, immediately before leaving my late regiment, the Second Life Guards, I had four cases of the disease among young horses just joined, and my farrier-major was accidentally inoculated on the finger. Surgeon Hensman, of the regiment, considered the case one of severe vaccination. The details are recorded in the *Veterinary Journal* for March, 1880.

So that since 1864, when the nature of horse-pox was forever settled by the observations and experiments of Bouley, and the discussions that ensued thereon at the Paris Academy of Medicine, the history of the malady has been largely supplemented by contributions from observers and experimenters in Europe and America, and Jenner's statement has been admitted by all who have studied the subject to be true, except in one particular—the "horse-pox" or "constitutional grease" being the source of cow-pox. In this only was Jenner in error. The two diseases are perfectly independent of each other. Cow-pox appears where there are no horses, or possible contact with horses, and where the men who attend upon these do not milk cows. It has frequently been observed that horse-pox prevails on a farm or in a locality, and no cow-pox is seen there; while the last-named disease may affect a number of cows in a dairy, and the horses be entirely free from horse-pox. Hering, for instance, states that cow-pox is very far from rare in Wurtemberg, while grease (*mauke*) is extremely uncommon; that men who work horses do not milk the cows, this office being undertaken by women in that essentially milk producing country; and that the majority of the proprietors of cows which had been affected with cow-pox had no horses.* In none of the recorded outbreaks of horse-pox has anything ever been said as to the existence of cow-pox, and no attempt has ever been

* "Gewiss der grosste Theil unserer Eigenthumer von Kuhen mit originare n Pocken hat gar keine Pferde." *Op. cit.*, p.9.

made to establish a relationship between the former and human variola, from which it differs as widely as the latter does from cow-pox. Horse-pox prevails entirely independently of small-pox or cow-pox. In some countries it is often present as an epizooty—as in Lower Canada; while in other regions, where it is enzootic, it will be more common in one part than another—as at Paris, where it is well-known, and at Lyons, where, according to Chauveau, it is not seen.

(To be continued.)

PRIZE ESSAY.

By J. T. DUNCAN, V.S. (Toronto.)

CONTAGIOUS DISEASES OF CATTLE.

(Continued from page 350.)

PROTECTIVE MEASURES.

The question of what steps should be taken once this plague appears in a country, is of the greatest importance to the community at large. Fortunately, so far, with this question the Dominion has nothing to do. But to be forewarned is to be forearmed, and considering the possibility of its introduction here, the proper course of action should now be determined on, in such an event.

Given the presence of this plague, then, two means of dealing with it present themselves, viz.: "Stamping out" and Inoculation. I say two, for no veterinarian worthy of the name would advise general treatment.

First, as regards "stamping out." The advocates of this system are uncompromising, and will admit of no modification of their method, nor have they much patience with those who wish

to try other means of combatting this affection. Prof. Williams says: "When the disease breaks out in a herd, the affected animals are to be isolated, or if in 'condition,' slaughtered for beef—experience having proved that such beef is good and wholesome if the animal is killed early in the disease."

Dr. Thayer says: "Stamping out is the most effectual and economical method of treating pleuro-pneumonia contagiosa."

Prof. Law says: "We do need a short and speedy stamping out of the disease in every locality where it has gained a footing. All measures which hinder this, whether proposals for investigation, or the impossible but delusive proposition to examine all our cattle while in transit, can but work evil, and only evil, to our live stock interests."

These views have been largely acted on in many countries.

Massachusetts has adopted this plan of dealing with the disease. New York State, and others, are following in her steps. Great Britain has attempted "stamping out" for years. Continental governments did the same till recently, when, owing to the progress of science, they have, to a large extent, adopted inoculation.

Disinfection.—Along with stamping out, thorough disinfection (by burning sulphur, whitewashing with lime, carbolic acid, etc.,) of all sheds and stables must be carried out.

This thorough stamping out, then, is one course open to us if pleuro-pneumonia should appear in Canada.

But in the second course which was mentioned as a means of controlling this plague, viz., Inoculation, we have a policy of protection which is more effective, more scientific, and which can be had at a tithe of the expense of "stamping out."

The use of inoculation as a prophylactic is not new. First attempted by Dr. Willems, in Belgium, 1851, it has since come into great favor in many parts of the world.

A Commission appointed by the French Government to test and examine the system, reported strongly in its favor.

It has produced marvellously good results in Australia, South Africa and the Continent of Europe. So great are its benefits seen to be, that some of the continental governments have made

inoculation compulsory. Notably in Holland have the good results of this measure justified its adoption.

Out of 22,348 cases inoculated on the Continent of Europe, we find that $24\frac{1}{2}$ per cent. were uninoculable, that is, gave negative results; but of the $75\frac{1}{2}$ per cent which showed results, 7.08 per cent lost their tails, 0.24 per cent. suffered from extensive gangrene, and 2.19 per cent. died, while about 1.25 per cent. contracted the disease on being exposed to contagion. This showing, compared with the results without inoculation, in which the deaths are from 30 to 50 per cent., speaks volumes in favor of this measure, which is upheld and advocated by the advanced and progressive veterinarians of the world.

It must not be supposed, however, that, excellent as is the record of inoculation, it has not its opponents. Some leading authorities object that—

1st. The deaths following inoculation are nearly, if not quite, as great as from the disease itself.

2nd. That it is but a means of spreading pleuro-pneumonia; and

3rd. That it does not afford immunity from its attacks.

In answer to these objections, it may be stated, that the first and third are fully answered by the results noted above, while the second has no foundation in fact, it being *impossible to produce pleuro-pneumonia by inoculation, as has been proved by many experiments.*

But, excellent as are the results hitherto noticed, the more recent ones obtained by Mr. Rutherford, V. S., of Edinburgh, eclipse them all.

Of these experiments Mr. George Fleming says (Veterinary Journal, 1879): "Mr. Rutherford's highly successful, intelligent and scientific practice of inoculation on a larger scale than has, perhaps, ever before been attempted in this country, leaves nothing more to be desired in the way of evidence as to the absolute immunity conferred by inoculation. * * *

No animal inoculated by Mr. Rutherford has ever been known, no matter how much it may have subsequently been exposed to infection, to become diseased, and the dairymen have no fear whatever in intro-

ducing suspected or sick animals among those inoculated. * * * The question of its efficacy and safety is now beyond discussion or dispute; thanks to Mr. Rutherford, the problem is solved and the freedom of Edinburgh from pleuro-pneumonia at the present time—a condition which has not been known to exist for more than thirty years—is mainly, if not entirely, due to his scientific skill.”

Other authorities and facts might be quoted in support of inoculation, but enough has been said to prove its value, and as it is of the utmost importance that the operation be performed properly (much of the prejudice against this measure being due to ignorance and carelessness) I give Mr. Rutherford's method of operating :—

“Taking the systemic conditions, first, I find that it is not advisable to inoculate cows immediately before calving. I would not like to do it upon any cow that had less than eight or ten weeks to run; nor is it advisable to do it immediately after calving. At least fourteen days ought to be allowed to elapse, and it should only be done then if the animal has, both locally and constitutionally, recovered from parturition. It should not be done, but deferred if there is the slightest degree of inflammatory action in any part of the body; in short, the animal should be, as far as we can ascertain, well in all respects. It should not be done if we consider the animal to be affected with pleuro-pneumonia; but, at the same time, I must tell you that I have reason to think that there is a stage in the disease, the very earliest, when, if inoculation is performed, good results may reasonably be expected to follow. I do not advise it however.

“It is not advisable to inoculate in very hot weather; and it is less advisable to inoculate during the winter months, unless special arrangements can be made for maintaining a uniform warm temperature. It is not, in my opinion, advisable to inoculate with any but one kind of virus, and that should always be fresh and free from any foreign matter; nor is it advisable to adopt any modification of the true method of inoculation. I would ask you to note that mild or modified inoculation is not to be depended upon, and should not, therefore, be practiced. I am

of opinion that there is only one mode of inoculation, and shall now describe it.

"The virus or lymph should be obtained from an animal not too far gone in the disorder and free from other diseases. "Lymph" is the amber-colored liquid exudate found in the interlobular tissue (described previously as *clear exudation*. See page 13). It may be obtained by cutting into this clear exudate and allowing it to drain into a vessel below. Too much care cannot be exercised in selecting the lymph, as its fitness is the most important thing in connection with the operation. Select and use, therefore, only the amber-colored liquid free from blood, serum and other extraneous matter. If not used immediately, preserve it by hermetically sealing the bottle.

"Having obtained your lymph, you saturate with it as many pieces of white worsted, eight to nine inches long each, as there are animals to operate on. The instruments used are a pair of strong clipping scissors, a pair of rowelling scissors, and the needle.

"The proper place to inoculate is the tip of the tail.

"In operating you require the assistance of two men and a lad; one man to hold the head, one to distract her attention behind with one hand, while with the other he grasps the tail firmly, while the lad holds the saucer containing the threads ready saturated for use.

"The operator, standing behind the animal, seizes the end of the tail and clips off the hair for five or six inches, only leaving a tuft at the end. Then with the rowelling scissors he makes the transverse cuts on the posterior aspect of the tail, three inches apart.

"The needle is then passed from below out at the upper cut, turned round several times sharply to enlarge the channel, threaded with a doubling of the worsted and then carefully withdrawn, leaving the thread in the tail; and after cutting off the two long ends the operation is complete.

"Within two or three days after inoculating, the part becomes slightly swollen, erythematous, but there is no discharge from the orifice. The swelling increases, and the animal is not

able to lift its tail. About the ninth day the skin becomes yellowish, and beads of amber-colored lymph exude, similar to that which was introduced. Occasionally a longer time is required for the exudate to appear; but when it does inoculation is considered to be successful, and the second stage is complete.

"There are now two courses open to the operator, and much of the success of the operation depends on which he will adopt. He may allow the process to run its course, which will generally be gangrene of the end of the tail. I do not advise this process, but find the best plan to be to remove the end of the tail when inoculation is once fairly established. There are cases in which this must be done even earlier, and there are others in which it may have to be accomplished more than once, as, for instance, when the sudden setting in of coldness of the end of the tail indicates the death of the part.

"Carefully examine the end of the tail. The part to come off may not be cold, but it will be wet with exudate and probably somewhat discolored for an inch or so above it. I find that where amputation is practised early, say on the twelfth to the fourteenth day, it is not necessary to make the division more than a finger's breadth or so above the upper incision made in inoculating.

"The amputation should be followed by profuse bleeding; if not, amputate higher up till bleeding follows. Neglect of this measure is apt to be followed by gangrene.

"After amputation many will heal without further inconvenience. In the majority, however, the stump will swell (and so long as it remains warm no anxiety need be felt), suppuration set in, and a small portion of tail thrown off. This, and the formation of abscesses on any part of the tail, are not to be feared. Only wash with carbolised water twice or thrice a day and dip the end of the tail in a strong solution of carbolic acid after milking.

"The abscess following exudate deposit may be an ordinary sequel of inoculation, or it may be the result of external injury. If from an external injury, it may appear on any part of the body. So long as an abscess forms, no danger is to be apprehended; but if instead of abscess you get extension of the exudate, loss of

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appetite and symptomatic fever, the case becomes grave, and the animal had better be slaughtered. In like manner should she be treated when the exudate extends to the genito urinary organs.

"Males, young stock and calves, I find from experience, can be inoculated with little or no risk. This is a very important fact; for should inoculation ever become general in the country, the necessity for doing it upon our home-bred stock when brought into dairies would be obviated by their being done at an early period of their life, when the operation, while being equally protective, is attended with little or no risk, and does not call for any after attention.

"I have nothing to say on the subject of diet while animals are under the operation. It only requires to be rather below than above the mark as to quantity for the first three weeks, and calculated to keep the stomach and bowels in order.

"In regard to medicinal measures, if it is deemed advisable to give any opening medicine, the purpose will be fully and efficiently met by the occasional admixture in the soft food of sulphur and treacle.

"This, of course, is with the view of lessening any attendant fever. I have not, however, found that there ever is much, the thermometer rarely rising above 102° F."

The above remarks do not include Mr. R's experience for 1879; this is found in the following answers to queries addressed to him by Mr. George Fleming:

1st.—Have any of your inoculated animals yet become affected with pleuro-pneumonia?—Answer, *None*.

2d. Have you tried inoculation on any animals but those of the bovine species?—Answer, *I have not*.

3d. Will animals once successfully inoculated take the inoculation as markedly as the first?—Answer, *They will not*.

4th. What is now your average mortality?—Answer, *One per cent*.

Here, then, we have the means of successfully applying this prophylactic measure, and the results of the operation fully set forth by the most successful operator living. He says:* "So cer-

*Address before the Scottish Metropolitan Veterinary Medical Association, 1879.

tain and absolutely protective is inoculation in its effects that I feel confident that, as its practice extends, the dread of pleuropneumonia will cease."

It cannot be doubted, then, that the enlightened practitioner will now, instead of depending alone upon "stamping out" to combat this plague, while carefully segregating his animals and destroying those found affected, will give to the unaffected portion of the herd the protection of inoculation, thereby reducing his losses to the smallest amount.

II.—CATTLE PLAGUE—RINDERPEST.

This affection—fearful as have been its ravages in Britain—we are not likely ever to see in this country. It is indigenous, not in Britain, but in Russia, with which country we have no trade in cattle. It is not known in the United States. In Great Britain it has been "stamped out." But, even did it exist in Britain, we are comparatively safe from its introduction, from the fact that its incubative stage is very short (eight days or less), consequently its presence would be manifest on the stock reaching our shores after the sea voyage. Nevertheless, it is well to be acquainted with its characteristics. The following account has been condensed from the writings of Professor Gamgee, one of the best authorities on the subject:—

"This terrible disease is a very contagious fever, characterized by specific lesions of the intestines, similar to those of enteric fever in man. It is confined to the bovine species, only rarely affecting sheep. It spreads somewhat slowly, and is not very fatal where it originates as an enzootic, but it is propagated very rapidly, and is the most fatal of all cattle plagues when it passes into Central Europe. The disease has a short period of incubation, and is characterized by alarming symptoms, which warn people early of its outbreak. It is not so insidious as pleuropneumonia—not seen in a latent form, therefore, cannot penetrate a country so readily unobserved.

"*Symptoms.*—The first signs consist in dullness, prostration, and a short, husky cough. The appetite is not lost, but is irregular; rumination is also slow and irregular. The animal grinds

its teeth, yaws, arches its back, draws its legs together under its body, and manifests tenderness of the loins. A fever shiver ushers in the next stage. The animal becomes hide-bound, its coat stares, there is still greater tenderness of the lumbar region. The gait is stiff, joints rigid, ears and horns alternately hot and cold; pulse frequent, hard and full; breathing labored, and secretions generally scanty. Rumination is suspended; deglutition performed with difficulty, thirst intense, and mouth hot and clammy. There is a watery discharge from eyes and nose. The eyes are blood-shot, eyelids swollen, and soon encrusted with the dried inspissated secretions from them. Saliva drops from the mouth. If blood is drawn, it coagulates with difficulty. The dry excrement and high colored urine are scanty and discharged with some difficulty. The abdomen is tense and tender. In cows the secretion of milk is stopped. In some cases general emphysematous swellings form at this period, and there are exacerbations of all the symptoms towards night-time. This stage lasts about three days.

"The symptoms increase in severity. Diarrhoea supervenes, great weakness appears. The pulse is 90 to 100, weak and indistinct at the jaw. The discharge from the nose and salivation increase. The cough is softer, and on the buccal and schniederian membranes, as well as in the clefts of the feet, a vesicular eruption is seen. Ulcers result wherever the vesicles burst.

"An unfavorable termination may be looked for when the body becomes cold, breathing quick, exhalations foetid, faeces (fluid or bloody) discharged involuntarily, abortion in cows, and symptoms of sensibility or consciousness lost. The animal dies from the third to the tenth day of the development of the disease.

"In favorable cases there is an early diminution in the severity of the symptoms; the diarrhoea is not severe, and there is a pustular eruption over the body, or a desquamation of cuticle. The convalescence is long, and may last several weeks.

"*Post mortem appearances.*—In the first, or catarrhal stage, the lesions are not characteristic of the disease, but, taken in connection with the history of the outbreak, may assist materially in diagnosis. The mucous membrane of the fourth stomach, es-

pecially near the pylorus, as well as the lining of the small intestine, is swollen, and shows red spots or streaks. The surface of the membrane is covered with a viscid, tenacious, reddish or bloody secretion, which is more or less mixed with the intestinal contents, and in the sub-mucous tissue there is a turbid semi-fluid exudation. In the large intestine only redness is noticeable, especially of the cœcum.

"In the second stage the lesions are more characteristic. There are numerous patches of yellow exudation most abundant near Peyer's patches, but also seen in the fourth stomach, near the pylorus. Peyer's glands themselves have a perforated appearance, and in the vicinity of these reddish yellow deposits around the glands there is a sort of catarrh or secretion from the mucous membrane.

"In the third stage the exudations or deposits spoken of get loose from their periphery towards the centre. They become soft, adhere in the centre, their edges floating, till at last they get quite free, and are discharged with the excrements. The portions of membrane from which these sloughs have separated are red and ulcerated, but the ulcers are not usually deep.

"The other organs of the body do not indicate any specific change. There is more or less redness and tumefaction of all the mucous membranes. The heart is soft and flabby, the lungs normal or slightly congested, the liver dark in color, its ducts and bladder full of bile. The mesenteric glands are apt to be swollen, and contain a yellowish red exudation, and may attain twice their natural size.

"*Treatment and Prevention.*—The curative treatment of this disease has failed as a rule. Preparations of chlorine, iron, or neutral salts, have been used, and only with success in mild cases, and especially in Russian cattle.

"The prevention of the disease when it is known to originate spontaneously, or to exist constantly, is sometimes attempted by inoculating the cattle, a practice recommended first during the last century, when the disease appeared in Britain."

When, however, the disease enters a country like our own, it is proper and prudent to kill out the diseased and infected animals, and prevent contagion by all known means.

III.—ECZEMA CONTAGIOSA (WILLIAMS); ECZEMA EPIZOOTICA (WALLEY)—FOOT AND MOUTH DISEASE.

Of the diseases hitherto spoken of, this is the only one which has been seen in Canada. "Last year (1875) we had an outbreak of foot and mouth disease in Ontario. It came through the medium of some sheep imported from England in the month of August. They were shipped from England (Liverpool, I believe,) apparently healthy, duly inspected and furnished with a clean bill of health (one of the fallacies of inspection.) When at sea several days some of them were noticed to be lame and sore, and the attendant thought they were cases of "foot rot," or, perhaps, simple bruises. These sheep were brought to the Province and located on two farms, sixty miles apart. The cattle on these and neighboring farms soon became affected with *eczema epizootica*, and there was considerable excitement in the districts so infected. On the part of the Ontario Government, I was requested to investigate the circumstances connected with the appearance of the disease, and also to adopt measures to prevent its spread. In all about 200 head of cattle were affected, and I had no difficulty whatever in tracing the origin of the disease to the sheep already referred to. * * * Of course I recommended isolation and no intercourse with the farms where diseased animals were, and in a few weeks its progress was arrested. The cold weather came on, and I assure you our Canadian winter proves the best of disinfectants." *

Definition.—A highly contagious and infectious febrile disease, associated with a vesicular eruption in the mouth, between the pedal digits and around the coronets.

* * * In milch cows it sometimes happens that a vesicular eruption occurs on the mammary gland, and within the lactiferous ducts. When such occurs, the milk contaminated by the vesicular discharge is rendered unfit for use either as food for the human beings or the lower animals.†

* Prof. Smith in Veterinary Journal.

†Williams.

Symptoms.—"Unlike rinderpest or pleuro-pneumonia, which are almost confined to the ruminantia, contagious eczema affects cattle, sheep, pigs, dogs, poultry, and even human beings;" cattle, however, suffering most.

After a period of incubation varying from twenty-four hours to three or four days, the invasion and progress of the disease are characterized by the elevation of the temperature of from two to four degrees; by the formation of vesicles, varying in size from that of a sixpence to that of half a crown, on the tongue, inside the lips, roof of mouth, and sometimes on the udder, whilst smaller blisters are apparent between the digits and around the coronets and heels, the animal at the same time presenting signs of uneasiness in the mouth and feet. * * In a short time the epithelial and cutaneous structures enclosing the vesicles are separated from the vascular structures and are thrown off in more or less rounded patches, leaving raw surfaces, which are, however, speedily recovered by epithelium. In some cases there is entire separation of the hoofs from the feet. It was at one time believed that an animal which had once suffered from eczema contagiosa was guarded against another attack. This is not the case, however; but one attack generally gives immunity during that season. Even this latter rule, however, is not an invariable one, as some animals will take it several times the same season.

Treatment.—Mild cases require but little medical treatment. If the mouth be sore, give plenty of cold water, in which may be dissolved a little nitrate of potash as a febrifuge. Soft, easily masticated food must be given in every case. Watch the feet carefully; if suppuration occurs, remove all detached horn and dress with mild astringents. "What I usually prescribe is an ounce of the concentrated solution of pure carbolic acid, one part to sixteen hot water, to twelve of white lotion; pledgets of tow dipped in this are to be bandaged on. This simple expedient, so generally neglected, will often prevent a lameness of many weeks' or even months' duration." If great weakness is manifest, stimulants, as brandy, whiskey and spirits of nitrous ether must be administered. In all instances bleeding, purging and other depleting measures are to be avoided. The bowels, perhaps consti-

pated at first, become loose as the disease advances; their condition is not to be interfered with, as frequently the morbid material is thus expelled. If the structures of the feet slough extensively, they must be treated by solutions of chloride of zinc or carbolic acid, say one of acid to eight of oil.

Sheep lose flesh very rapidly while suffering from foot and mouth disease. They suffer more in the feet than cattle, and consequently require more careful vigilance. It is a good plan to cause the affected flock to walk through a shallow trough containing the above named weak astringent and antiseptic solution once or twice a day. And, finally, it is my opinion that both cattle and sheep ought to be washed before they are allowed to be driven on a public road, or exposed in a market if they have recently recovered from this disease. It may be difficult to do this with large herds of young cattle, and its compulsion would be considered a hardship, but of two evils it is incomparably the lesser.*

IV.—VACCINE VARIOLA.

In speaking of contagious diseases of cattle, I have adopted Williams' classification of those diseases.† By this classification only *variola vaccina*, or cow-pox, remains to be considered.

Definition.—A contagious, febrile and eruptive disease, resulting from the presence of a specific poison, which is reproduced and multiplied in the animal body during the course of the malady.— * * * WILLIAMS.

Cow-pox and the small-pox of man are undoubtedly identical, as has been proved by inoculating cows with the lymph of human small-pox, as well as by other experiments, such as enveloping cows in blankets in which small-pox patients lay. *Variola vaccina* has been produced by these experiments.

There are many forms of eruption in the udder of the cow which may be confounded with those of *variola*, but those of *variola* have certain special characteristics. The local symptoms of true *variola* are heat and tenderness of the teats for three or

* Abridged from Principles and Practice of Veterinary Medicine.

† Principles and Practice of Veterinary Medicine.

four days, followed by irregular pimply hardness of the skin, more particularly about the base of the teats.

The pimples may sometimes be felt in five days after communication; they assume a red hue when about the size of a pea, are very painful and hard, gradually increasing in size, and in three or four days attain that of a horse-bean. They rise in the centre, become more or less pointed, containing at first a clear, and ultimately a turbid fluid. If the vesicles are broken, troublesome ones supervene, the discharge from which will communicate the disease to the milker, if he is not protected by previous inoculation. The pustules become depressed in the centre, and dry scabs form on the surface. Some of these slough, leaving a raw surface.

The crusts, if left undisturbed, become thicker, and spontaneously separate in about three weeks, leaving a small depression or pit.

In hot climates, *variola vaccina* is sometimes fatal, but in temperate climes, there is but slight diminution of milk, with almost no loss of appetite.

When a disease breaks out in a dairy it is apt to spread to the whole herd, unless affected animals are separated from each other, and different attendants employed.

The milk should be drawn off with a syphon, and if the mammary gland be much inflamed, it should be thoroughly fomented, and dressed with a cooling lotion; a saline purgative (or laxative rather) be given, together with nitrate of potash dissolved in the water.

As a general rule, no medicinal measures are required, however.*

I have thus passed briefly in review the contagious diseases of cattle. Press of professional duties has prevented me giving the time to the subject that I could have wished to devote to it; but I hope that in these pages will be found the *practical* questions in connection with the disease, discussed with sufficient fulness and clearness to repay their perusal by all interested in the conservation of our present immunity from them.

* Prof. Williams.

SOCIETY MEETINGS.

THE MONTREAL VETERINARY MEDICAL ASSOCIATION.

This association held its usual fortnightly meeting in the lecture room of the Veterinary College, Union Avenue, on Thursday evening last, the president, J. C. Alloway, Esq., V.S., in the chair, and a full attendance of members was present. After the usual preliminary business had been disposed of, the members proceeded to ballot for the candidates proposed for membership at the last meeting, which resulted in the election of the following gentlemen:—Messrs. A. W. Clements, R. T. Whittlesey, T. J. O'Connell, Alfred W. Mears, James Brodie, J. A. Duncan, B. A. Pomroy, W. Lemay, George W. Goetz, C. B. Robinson, L. H. Bergeron, P. Paquin, T. Paquin, Pierre Gadbois and V. T. Danhigny, V.S. Messrs. E. Crevier and Philias Labell were then proposed as members to be balloted for at the next meeting. The Chairman then announced that a very interesting communication had been received from M. J. Tracy, Esq., M.R.C.V.S., of Milwaukee, Wis., of a case of "intestinal umbilical fistula," which had been successfully treated by that gentleman, and called upon the Secretary to read same to the meeting, which was listened to with marked attention, followed by an interesting discussion, the members complimenting that gentleman upon the skill with which he had treated the case. The Chairman then called upon Mr. C. H. Ormond to read his communication on the subject of "Purpura Hæmorrhagica." The reader described several cases, being part of a large number successfully treated by him during an epizootic attack at Milwaukee, Ill., last summer. He described the symptoms, which were variable, and his mode of treatment, which was peculiar to the different phases of the disease. He could not assign any definite cause of the outbreak, but thought it arose from some septic matter contained in the atmosphere. The communication gave rise to an interesting discussion.

Prof. McEACHRAN then addressed the meeting on the subject

of "Tuberculosis." He explained the importance of the subject to the veterinary profession, owing to the alarming increase of the disease in the finer breeds and more valuable cattle, especially among the shorthorns, Devons, Ayrshires and Alderneys. Instances could be adduced of valuable herds being decimated, and the owners ruined by it. He explained the pathological anatomy of tubercle, and pointed out the fact that it was a common error in both professions to suppose that caseation was always to be taken as tubercle. He explained that this degeneration of fluid, such as pus or that form of caseation so easily induced in rabbits, erroneously called yellow tubercle, was not really so. When an animal was inoculated with tubercle it invariably became tuberculous, and while septicemia or blood-poisoning may result from inoculation with simple caseous substance, tuberculosis never did. He next drew the attention of the members to the experiments of European investigators, which went to prove conclusively that tuberculosis was communicable from one animal to another by ingestion of tuberculous matter, by the flesh and fluid of tuberculous animals, by the milk, by the expectorated sputum, and by the stalls and feed boxes in which tuberculous animals have been kept. The reports which were read of experiments to prove these facts, were very conclusive. The hereditary nature of the disease was long known. It was, therefore, clearly the duty of this profession to advise stock-owners not to trifle with this insidious plague in their herds, but to take the only safe plan to rid themselves of it, which is not only not to breed from them, but to kill them off and bury or burn their carcasses. The disease was now far more common than it ever was, because cattle breeding was now more extensively carried on, and he felt convinced that it was spread and bred through ignorance of its nature.

In this paper it was not his intention to speak of it in a sanitary point of view, but he could not conclude without remarking that what is true of its communicability from one animal to another is also true of its communicability to the human family, and where the milk or flesh of consumptive cattle was allowed to be eaten by people, he had no doubt that the disease would be communicated in many instances. True, the gastric fluids were all-powerful

in destroying infecting principles, but to the speaker's mind there was no safety to a community, especially to children, where flesh or fluid containing the elements of such a disease as that under consideration were allowed to be sold unrestricted. The advantage, therefore, of a well-regulated abattoir, under a thorough system of scientific inspection of all animals killed for public consumption, were evident; and of no less importance was the supervision of all public dairies, and the periodic inspection of the cattle supplying our children with a fluid which constituted the chief article of their diet. In the discussion which followed, in reply to the question, "Why was it that consumption was so rarely seen in children?" the speaker said it was a mistake to suppose such was the case; who can tell how many of those cases of tubercular spinal meningitis, which were, alas! too common, and in which no tubercular family history could be traced, were produced by the milk of a tuberculous cow? It was now well understood that in many of the cases of so-called cholera infantum, milliary tubercles were found to exist. It must not be forgotten also that consumption in the human family, even in the hereditary form, generally developed in early adult life, and there is no reason why it should not develop sooner when the contagion was received in another way than by the blood of the parent.

For the next meeting, November 12th, Mr. C. J. Alloway, V. S., will read a paper on "Sanitary Measures," and Mr. E. J. Carter will communicate a case of "Pleurisy."

After a vote of thanks to the essayists, the meeting was brought to a close.

EXCHANGES, ETC., RECEIVED.

HOME EXCHANGES.—National Live Stock Journal, Medical Record, American Agriculturist, Prairie Farmer, Ohio Farmer, Practical Farmer, Surgical Reporter, Bulletin of the National Board of Health, Scientific American, Turf, Field and Farm.

FOREIGN EXCHANGES.—Gazette Medicale, Annales de Belgique, Archives Veterinaires, Recueil de Medecine Veterinaire,

Veterinarian, Veterinary Journal, Revue fur Thierheilkunde und Thierzucht, Clinica Veterinaria, Revue Dosimetrique, Revue d'Hygiene, Journal de Zootechnie, Schweizerisches Archiv fur Thierheilkunde und Thierzucht.

BOOKS.—Contagious Diseases of Swine and other Domestic Animals, (U. S. Dept. of Agriculture), Horse's Teeth (by W. H. Clarke), Bulletin de la Societe Cultrate de Medecine Veterinaire, Bericht uber das Veterinarwesen in Konigreiche Sachsen fur das Jahr, 1879, Die Kanigliche Thierarzneischule zu Dresden in dem ersten Jahrhundert ihres Bestehens.

JOURNALS.—The Gazette (Montreal), News and Courier (Charleston).

CATALOGUE.—Catalogue of Blossom Farm (Mobile).

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